RCN: OceanObsNetwork

Annual Report for 2012

Francoise Pearlman, Jay Pearlman and Albert Williams III, editors

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1. Overview.

The goal of the RCN OceanObsNetwork [RCN] is to foster a broad, multi-disciplinary dialogue, enabling more effective use of ocean observing systems, consistent with national and international efforts, to inform societal decisions.

To achieve this goal, the RCN has defined a series of objectives:

- Motivate commitments to sustaining ocean and marine observing systems
- Stimulate inter-disciplinary cooperation for both observations and analyses
- Facilitate open exchange of ocean data
- Promote interoperability
- Improve the flow of critical ocean observation information to key stakeholders
- Stimulate capacity building and retention in ocean and marine observations community

The RCN will also consider related issues such as integration of space-based and in-situ measurements, and innovative concepts in sensors, information systems and user interfaces. The network members may propose additional subjects.

See Appendix I for the complete RCN Terms of Reference.

The RCN consists of senior ocean scientist from the US and other countries from a number of ocean science disciplines. The RCN members are listed in Appendix II.

Appendix III through VIII include key products developed during 2012.

The following paragraphs highlight the RCN activities for 2012. Table 1 summarizes the products generated and provides references to this report's Appendices or links to the Internet as appropriate.

2. Working Environment.

The RCN operates primarily through electronic information exchange. Its members use websites, discussion forum and other tools for communication and collaboration (see details under "Web Outreach" below).

The RCN meets three times per year, two virtual meetings and an annual in-person meeting. In 2012, the virtual meetings were held in March and September. The face-to-face meeting was held in San Francisco on December 2, prior to the start of the AGU meeting.

The RCN Plenary reviews and comments on WG reports prior to their public release and forwarding to appropriate parties. Coordination of the RCN activities with existing networks is facilitated by RCN members whose organizations are participating in those networks.

3. Working Groups.

The RCN is primarily a forum to address issues of enhancing ocean observation and information and the challenges of multi-disciplinary research across the ocean sciences. It is not a body chartered to undertake new scientific research. Issues engaged by the RCN are addressed by the body as a whole (Plenary) or through working groups (WG) constituted by the RCN. A working group generally focuses on one of the RCN objectives and produces a report clearly identifying the issues, approaches, impacts and recommendations for achieving the objective(s).

Working groups have a defined term of operation, generally six months (renewable), to assess issues and then submit their ***recommendations*** for review by the Plenary. The reviewed recommendations will be provided to international, national and program level organizations for consideration and possible implementations.

Members of the RCN and other invited experts constitute working Groups. They operate under a Working Group Terms of Reference that include objectives, a schedule, an operations modality and a list of deliverables. Network members may serve on multiple working groups. In their deliberations, the working groups may invite external experts to make presentations and provide background on issues being addressed.

Two working groups were initiated in 2012. The Open Data Working group was started in early May, and was composed of three task teams:

- Open data formats and standards
- Data access models
- Data publication/citation.

Reports from the 3 task teams were briefed at the December Plenary and are undergoing final review. Draft versions are submitted with this Program report.

The Outreach and Education working Group was started mid-August and focused on a webinars series. Two webinars were conducted so far with good attendance.

4. Outreach and Dissemination.

In addition to the webinars mentioned above, RCN members attended a variety of national and international meetings such as the OES 2012 Virginia Beach conference, the Blue Planet GEO meeting and the AGU. Presentations were given, and papers released as part of the proceedings. In addition, an OceanObs RCN flyer was developed and distributed.

5. Standards and Interoperability Registry and Best practices Wiki.

To further support interoperability, the RCN is supporting an update of a registry for standards and best practices. This effort, being done under subcontract, focused

on compiling information related to existing and planned standards for infrastructure interoperability and data quality metrics within ocean observing systems from an end-to-end system perspective. The goal is to provide core information upon which interoperability on a global scale can be envisioned, as it relates to the functionality and interfaces of ocean observations that provide utilities and infrastructure for sensors and information flow.

The collected standards were then entered into the Standards and Interoperability Registry (SIR). Also, best practices were entered into the Best Practices Wiki (BPW), in an area configured for the RCN effort.

For data applications, data quality needs to be addressed. The RCN will support the dialogue on quality indicators, drawing on the experts in the network and interacting with the broader IT/scientific expertise available within the international community. A compendium of quality indicators was built, including what has already been accomplished and what is actively ongoing. This will provide a basis for the quality effort that will begin in 2013.
See Appendix VIII for the registry and best practice wiki report.

6. Web Outreach.

The following websites provide information regarding RCN activities:

- Oceanobsnetwork.org
- Oceanrcn.net
- Oceanmysteries.net (webinar advertising and registration).

In addition, an article on Rita Colwell was published in Earthzine [www.earthzine.org], a web magazine aimed at the general public.

7. Plan for Next Year.

In 2013, the RCN will continue its emphasis on the objectives enumerated above.

- The draft Open Data Working Group will finalize its draft report and issue a document;
- The education and outreach will continue the monthly Ocean Mysteries webinar to extend interest in the oceans, with an emphasis on outreach to non-specialists. The program will establish, expanding upon existing data bases, a compendium of on-line education courses for ocean studies. These will be part of an outreach to a generation of young and potential scientists, both in developed and developing regions. Outreach through articles on the web will be continued through Earthzine and other sites. Where it would benefit the community, the Program will work with international organizations such as GEO as part of its outreach efforts.

- The Plenary identified two initiatives could begin in 2013/4. These are: (1) a study of the interplay between remote sensing and insitu observations and approaches that could make the overlay of data more effective; (2) the expansion of interdisciplinary work to include social sciences. The first area will have a working group that will be chaired by Jim Yoder to start in 2013. The second area is very broad and needs to be better defined before it can be initiated, perhaps with an identified use case as a means of focusing the work. It may follow or be simultaneous with activities that are focused on interdisciplinary collaboration among ocean scientist.
- Further progress is anticipated on standards and best practices. In 2013, one area of ocean sciences will be identified to prototype the best practices registry. The program will solicit interest from a recognized oceanographic institution to provide leadership in this area.
- Coordination with other international activities will be continued.

8. Picture Gallery – December 2nd in person meeting

Front Row – left to right: Dawn Wright, Bob Houtman, Lisa Raymond, Francoise Pearlman, Heidi Sosik.
Rear Row – left to right: Chris Scholes, Sandy Williams, John Orcutt, Benoit Pirene, Chris Edwards, Jim Yoder, Peter Pissierssens, Simon Allen, Eileen Hofmann, Christoph Waldmann, James Gallagher, Pauline Simpson, Takeshi Kawano, Paul Bunje, Yasunori Hanafusa, Jay Pearlman

Panel on Cross Discipline Collaboration at RCN meeting 12-2-12:
Paul Edwards, Ray Schmitt, Chris Scholin, Heidi Sosik, Eileen Hofmann, Dawn Wright.
Panel was moderated by Rick Spinrad (not shown)

9. Events and activities references.

Date	Activity	Reference
February 1, 2012	RCN Award	
February 15-17, 2012	Planning meetings	
February 20-23, 2012	AGU Ocean, Salt Lake City	
February 21, 2012	GEO Community of Practice Meeting	
March 14, 2012	RCN Meeting	Appendix III a – Minutes for RCN Virtual Meeting, March 14
March 18, 2012	RCN Presentation at NAS Ocean Science Board meeting – Jay Pearlman	Appendix IV a – RCN Oceans meeting See presentation at https://docs.google.com/open?id=0B6ovZrDP KFGuRll6LU45cTBCY3c
May 2, 2012	Open Data Working Group meeting	Appendix III b – RCN Open Data working group, May 2 meeting minutes
June 7, 2012	Open Data Working Group meeting	Appendix III c - Open Data Working Group Terms of Reference Appendix III d – RCN Open Data working group, June 7 meeting minutes
July 2, 2012	Open Data Working Group meeting	Appendix III e - RCN Open Data working group July 2 meeting minutes
July, 2012	IOOS Summit community white paper submitted	Outreach and Collaboration – Emerging Activities Janet Fredericks et. al. Ref on IOOS Summit website -see paper at https://docs.google.com/file/d/0BwW7dLnW T2C0TFhCbC15bUlMMGM/edit
August 20, 2012	Outreach and Education Working Group planning meeting	
September 3, 2012	Meeting with Albert Fisher re Webinars and RCN	
September 13,	Open Data Working	

2012	Group	
September 14, 2012	Webinar Planning Meeting	
October 15-19, 2012	Oceans 2012 Virginia Beach	Appendix IV - presentations, posters, and papers IV b Paper on Interdisciplinary Ocean Research – addressing the challenges – Jay Pearlman et al. https://docs.google.com/open?id=0B6ovZrDP KFGuOF93X1ZkaE1DT3M IV c Presentation on Interdisciplinary Ocean Research – addressing the challenges – Jay Pearlman et al. https://docs.google.com/open?id=0B6ovZrDP KFGuZ0pSOTZSZXBJaGs IV d Paper on A new Perspective on Long Term Oceans observation – Christoph Waldmann et al. https://docs.google.com/open?id=0B6ovZrDP KFGuWEhQamF1emJjMjg Appendix VII – outreach material VII a RCN Flyer
October 16, 2012	Ocean Mysteries Webinar – Rita Coldwell	Appendix V a – webinar announcement for Rita Colwell
November 8, 2012	Ocean Mysteries Webinar – Tony Haymet	Appendix V b – webinar announcement for Tony Haymet
November 18, 2012	Blue Planet GEO meeting, Ilhabela, Brazil	Appendix IV - presentations, posters, and papers IV e – Poster The Ocean Research Coordination Network Interdisciplinary Collaboration, Jay Pearlman and Albert Williams 3rd See presentation at https://docs.google.com/open?id=0B6ovZ DPKFGuaUt6YzRjdnNEb2M
November 23,	Open Data Working	Appendix VI – RCN reports

2012	Group	VI a – Open data formats and standards. See report at https://docs.google.com/open?id=0B6ovZrDPKFGuZHU1dzUyU1lHMkE VI b – Data access models. See report at https://docs.google.com/open?id=0B6ovZrDPKFGuMEJweGczVXpmb3M VI c – Data publication/citation. See report at https://docs.google.com/open?id=0B6ovZrDPKFGualo0OFJRajhQRTg
November 28, 2012	Earthzine article: Rita Colwell keeping her aim on cholera	http://www.earthzine.org/2012/11/28/rita-colwell-keeping-her-aim-on-cholera/
December 2, 2012	RCN Plenary	Appendix VI d – RCN plenary report Link to report: https://docs.google.com/folder/d/0B6ovZrDPKFGubVFRYjRuQ21uelk/edit Link to presentations: http://rcn.iode.org/index.php/component/content/article/2-uncategorised/20-rcn-oceanobs-plenary-meeting-2012

Appendix I – RCN Terms of Reference.

Background

The oceans provide many important functions within the Earth system including strong coupling with weather and climate dynamics, providing food and energy resources, supporting trade and commerce, offering extensive stabilization for variations in our environment and being a resource for biodiversity. The need for improved coordination in ocean observations is more urgent now given the issues of climate change, sustainable food sources and increased need for energy. Ocean researchers must work across disciplines to provide policy makers with clear and understandable assessments of the state of the ocean.

New technologies and approaches are emerging to vastly improve ocean observations. Cabled observatories are an example of a paradigm shift, providing a relative abundance of power and bandwidth for observations covering scales from cm to km and times from seconds to decades. Sensors traditionally only available in laboratories can now be adapted for in-situ observations. The potential for interdisciplinary collaboration is significant. The Oceans RCN is a forum to address these issues and develop recommendations on key topics of ocean observation and information.

Goal

The goal of the RCN is to foster a broad, multi-disciplinary dialogue, enabling more effective use of ocean observing systems, consistent with national and international efforts, to inform societal decisions.

Objectives

To achieve this goal, the RCN has defined a series of objectives:

- Motivate commitments to sustaining ocean and marine observing systems
- Stimulate inter-disciplinary cooperation for both observations and analyses
- Facilitate open exchange of ocean data
- Promote interoperability
- Improve the flow of critical ocean observation information to key stakeholders
- Stimulate capacity building and retention in ocean and marine observations community

The RCN will also consider related issues such as integration of space-based and in-situ measurements, and innovative concepts in sensors, information systems and user interfaces. Additional subjects may be proposed by the network members.

In achieving these objectives, the RCN will motivate new research outcomes, provide wider visibility for the value and impacts of ocean observations and encourage a new generation of scientists to focus on the oceans and their challenges.

Operations and Working Methods

The RCN is primarily a forum to address issues of enhancing ocean observation and information. It is not a body chartered to undertake new scientific research. Issues engaged by the RCN will be addressed by the body as a whole (Plenary) or through working groups (WG) constituted by the RCN. A working group will generally focus on one of the objectives cited above and will produce a report clearly identifying the issues, approaches, impacts and recommendations for achieving the objective(s). Working groups will have a defined term of operation, generally six months (renewable), to assess issues and then submit their recommendations for review by the Plenary. The reviewed recommendations will be provided to international, national and program level organizations for consideration and possible implementations. Working Groups will be constituted by members of the network and other invited experts. They will create Terms of Reference including objectives, a schedule, an operations modality and a list of deliverables. Network members may serve on multiple working groups. In their deliberations, the working groups may invite external experts to make presentations and provide background on issues being addressed.
The RCN working environment will be as follows:

1. The RCN will operate primarily through electronic information exchange. The RCN will have websites, discussion forum and other tools for communication and collaboration.
2. The RCN will meet three times per year, two virtual meetings and an annual in-person meeting.

3. The RCN Plenary will review and comment on the WG reports prior to their forwarding to appropriate parties.
4. The RCN will work closely with existing coordination bodies and mechanisms for ocean and marine observations. Coordination with existing networks will be facilitated by members of the Steering Committee and senior network members whose organizations are participating in existing networks such as those under UNESCO IOC and GEO.

Outputs

The RCN will develop and deliver reports covering subjects that support achieving the objectives above. The reports will identify issues, approaches and recommendations for achieving the objectives.

Participation

The RCN will be a long-term international forum on observatories, data, modeling and information for scientists and users of ocean information. Broad participation of physical and biological/biogeochemical oceanographers in the RCN is essential. Inclusion of nonscientist end users and decision makers in the RCN will be strongly encouraged.

The RCN is initially constituted by Steering Committee and senior network members. A list of current participants will be maintained on the RCN electronic repository (e.g. the website or wiki). Additional network membership is expected to include scientists from current observing systems and also data and information users from

government, industry and education and research institutions. These will initially be solicited though contacts by the Steering Committee and the senior network members.

Appendix II – OceanObsNetwork Members/Volunteers.

First Name	Last Name	Organization	E-mail address
Simon	Allen	CSIRO	simon.allen@csiro.au
Pierre	Bahurel	MyOcean	Pierre.Bahurel@mercator-ocean.fr
Stewart	Bernard	CSIR	sbernard@csir.co.za
Paul	Bunje	XPRIZE Foundation	Paul.Bunje@xprize.org
Jorge	Corredor	University of Puerto Rico	jcorredor@uprm.edu
Benjamin	Cuker	Hampton University	benjamin.cuker@hamptonu.edu
Paul	DiGiacomo	NOAA	Paul.digiacomo@noaa.gov
Chris	Edwards	UCSC	cedwards@ucsc.edu
Albert	Fischer	GOOS	a.fischer@unesco.org
Masao	Fukasawo	JAMSTEC	Fukasawa.nigc@nifty.com
James	Gallagher	Opendap	jgallagher@opendap.org
Eileen	Hofmann	ODU	hofmann@ccpo.odu.edu
Bob	Houtman	NSF	bhoutman@nsf.gov
Yosunori	Hanafusa	JAMSTEC	hanafusay@jamstec.go.jp
Milton	Kampel	INPE	Milton@dsr.inpe.br
Takeshi	Kawano	JAMSTEC	kawanot@jamstec.go.jp
Fred	Maltz	IEEE	f.maltz@ieee.org
Mike	McCann	MBARI	mccann@mbari.org
Kate	Moran	Oceans Network Canada	kmoran@uvic.ca
John	Orcutt	UCSD	jorcutt@ucsd.edu
Francoise	Pearlman	IEEE	jsp@sprintmail.com
Jay	Pearlman	IEEE	jay.pearlman@ieee.org
Benoit	Pirenne	University of Victoria	bpirenne@uvic.ca
Peter	Pissierssens	IODE	p.pissierssens@gmail.com
Habs-Peter	Plag	Wits University	hpplag@unr.edu
Lisa	Raymond	WHOI	lraymond@whoi.edu
Ray	Schmitt	WHOI	rschmitt@whoi.edu
Chris	Scholin	MBARI	scholin@mbari.org
Iain	Shepherd	EC Marine	Iain.shepherd@ec-europa.eu
Pauline	Simpson	Central Caribbean Marine Institute (CCMI)	psimpson07@aol.com
Heidi	Sosik	WHOI	hsosik@whoi.edu
Rick	Spinrad	OSU	rick.spinrad@oregonstate.edu

Christoph	Waldmann	University Bremen	waldmann@marum.de
Sandy	Williams	IEEE	awilliams@whoi.edu
Dawn	Wright	ESRI	dwright@esri.com
Jim	Yoder	WHOI	jyoder@whoi.edu

Appendix III – Meeting Minutes.

III-a RCN virtual meeting, 14 march 2012.

RCN Virtual Meeting 14 March 2012
WebEx and Phone, Start at 9AM EDT, 13:00 UTC
Participating: Jay Pearlman, Sandy Williams, Simon Allen, Pierre Bahurel, Paul DiGiacomo, Masao Fukasawa, Eileen Hofmann, Milton Kampel, John Orcutt, Peter Pissierssens, Hans- Peter Plag, Iain Shepherd, Heidi Sosik, Martin Taylor, Christoph Waldmann, Jim Yoder
AGENDA:
1. Introductions
2. Program
3. Approach for operations, Meetings
4. Working Groups and other Activities
5. Discussion of Open Data WG
6. AOB

1. Participant introduced themselves, providing background and interests.
2. RCN background and planning presentation:
Jay Pearlman presented an introduction to Research Coordination Networks. There is interest in broad participation from the disciplines of ocean science and engineering. His presentation touched upon the objectives of the RCN and the focus areas indentified in the NSF proposal. These include:
3a. Approaches for Sustainability of Observing Systems
3b. Stimulating interdisciplinary cooperation
3c. Facilitating Open Exchange of Data and Information
3d. Promote Standards and Interoperability including approaches for common sensor builds
3e. Improving the flow of critical information to key stakeholder
3f. Capacity Building
3g. Outreach and Community Building

Additional ideas for discussion (working groups) are:
Insitu - remote sensing observation correlations
Volunteer observations
Low cost common sensors

The logistics and infrastructure for the RCN were presented including the identification of plenary and working group meetings. More details are in the meeting presentation that has been distributed (and will be on the RCN web site). The operating paradigm for the RCN is similar to a board of the US National Academy of Science that addresses a subject, looking at issues and alternative

approaches, and then develops a paper with recommendations. There are 9 working topics planned, with more anticipated from the network.
A user perspective was presented. While technology growth and innovation will impact our approach to ocean observation and information, it is still important that users perceive they are getting data from a trusted source with data and information that has consistency, quality, and sustainability. Scalability of coverage is an issue. Data should be open. Sustainability is important for a researcher to commit the effort to train a person to learn to provide measurements.

General discussion at this point:

Christoph Waldmann asked if we could include discussions on a scientific objective. Could we have a topic that is scientific? Yes, the group needs to choose.
Martin Taylor spoke of building international communities of science enabled by new capabilities such as cable observatories. Building the cultures has its challenges.
There was a discussion on low cost sensors. Simon Allen said that the sensor quality is essential for reliable repeatable measurements. Low cost is achievable in mass markets like the iPad. However, there are only three thousand Argos sensors in the ocean and that scale does not represent a mass market to manufacturers. Hans-Peter Plag said that low cost sensors may be in conflict with suitability for purpose. Further conversations in this area are suggested for one of the identified working groups.

3. Continuing with the presentation by Pearlman:

Reviewing the list of RCN members, Sandy and Jay invited expanded participation in the RCN. The Network is not restricted to those already participating; others can be added. Each of us should suggest 3 or 4 colleagues to be added.
The RCN will have three Plenary meetings, two Virtual and one Face-to-Face, per year. There are international meetings that some of us go to but we don't all go to the same meetings. Therefore selection of a location for the face-to-face meeting is not easy. We are proposing December 5, the day before the AGU Fall Meeting in San Francisco for the first face-to-face meeting. The next virtual meeting will be in September when the first working group reports out since one of the activities of the Plenary is to review and comment upon working group reports.

4. Working Groups and other Activities

Working groups are a subset of the team, typically 6 to 8 people that address a selected topic. The terms of reference for the working groups needs to be defined and the first working group will develop its own terms of reference and we will observe the lessons learned. The working groups will have two co-chairs who will guide the process. There will be two working groups working at a time, three months out of phase. This will reduce the overlap of member commitments.
Other activities of the RCN include capacity building and team build events with broader community participation. We wish to have Webinars, which will be one-hour web-based seminars, by our senior members. Each of us should give a seminar on our technical work. Typically there will be four per year, announced well in advance. Invitations would be extended to the global community through our member contacts.

Open Data Exchange will be the first working group. John Orcutt and Peter Pissierssens will co-lead it. Terms of reference will be decided on the first meeting as noted above. Tentative issues to be addressed are Intellectual Property, latency of data availability, liability (hold supplier of data blameless), reward system (for publishing data), sustained information flows and policy for provenance.

5. Discussion of topics for the Open Data Working Group:

Plag said that the quality issue is being addressed by an international community in GEO for data citation. Taylor suggested that monitoring use of data and the outcomes of data use is important for performance assessments of large observation systems. This is an issue for sustainable funding. Allen added that repurpose of data creates issues and is hard to monitor. From the perspective of the biological science, we need to talk about how to deal with uncertainty – names of common fish are not uniform from region to region. Iain Shepherd said that accuracy and precision labeling of the data is important. Open access hides where the data are held and therefore makes discovery more difficult. There are 50 or more institutions in Europe holding relevant data. Identifying where the data are is an important step. Iain is not advocating central repositories as a solution, but is looking for a more effective way to discover and then access data. Heidi Sosik said that all of the problems in physical data are more so in biological data, particularly with the new generation of sensors. There is also a cultural problem in learning to manage quality and provenance. If we (the ocean biologist community) embrace the challenge we can make progress working with informaticists. Shepherd said that putting data together from different surveys is difficult. He agrees that provenance information is needed to overcome the challenges. Going forward we can build systems that avoid the same problems five years in the future. Pierre Bahurel said that we need to recognize the users of data and that the many users have different needs. Open data discussions usually address technical barriers but there is a serious need to address the issues from a user perspective also – private industry, government, science, etc. Orcutt said the OOI is concerned with how the user will use the data. The data have extensive amounts of metadata. The issue of biology is much more complex than physical measurements. Microbial components of an ecosystem are very difficult; speciation isn't even characteristic of all organisms. These are some of the subjects that the RCN recommends that the first Open Data meeting should address.

6. Any Other Business

In closing the meeting, Jay Pearlman remarked on the GEO Ocean Community of Practice. GEO formed an Ocean Community of Practice last year led by Albert Fischer and Bob Houtman and facilitated by Jay Pearlman. In the new work plan of GEO for 2012-2015, there is a task called the "Blue Planet" led by POGO and Trevor Platt. The GEO Ocean Community of Practice (CoP) will inform this task. What is the difference between the Community of Practice and the RCN? The RCN is a multi-disciplinary science focused community that will work with the GEO CoP that is focused on ocean observations. There are overlaps of interest and these will be used as points of synergy and cross support.

Jay Pearlman announced that the next Virtual Plenary Meeting will be held in September or early October. Selection of a date will be done through a Doodle poll to be issued shortly. He thanked all of the RCN members for joining the meeting.
10:23 EDT, 14:23 UTC Sign off.

III-b **Ocean RCN Open Data Working Group, May 2nd Minutes.**

Minutes of the May 2 meeting of the Open Data WG
Attending the meeting were: John Orcutt (co-chair); Pierre Bahurel; Paul DiGiacomo; Albert Fischer; Tak Kawano; Francoise Pearlman; Jay Pearlman; Benoit Pirenne; Iain Shepherd; and Christoph Waldmann. Peter Pissierssens was unable to attend due to illness, but provided the communications (webex) support.
The meeting was opened by John Orcutt. John welcomed all participants. He pointed to the documents he had distributed prior to the meeting on open source licensing and digital object identification (DOI).
John explained the ground rules for the working group:

- Objective: address and recommend paths forward for key issues in Open Data for ocean science and applications.
- Group works through study teams and outputs are reports of topics the WG has selected for its agenda; steps include defining areas of WG interest, picking specific topics, and setting up smaller task groups (study teams)
- Working group duration is about 6 months; output is an integrated report prior to AGU in December

John then asked each of the group to provide a brief description of their background and potential subjects for consideration:

Bahurel (coordinator of MyOcean - MyOcean delivers observation or forecasting data under an free and open data policy) - Operating under a free and open data policy, data and information providers want to know if their service has real "added value". In addition, there is a question of operations and business model. Looking at the end user, should users be expected to download and store all the data they need or should actions be web-based for both data and modeling? This becomes particularly important when users need a wide variety of data and information for their work.
DiGiacomo (NOAA research and Coastal Zone CoP) – The major issues for the ocean community are: (1) ensuring international access to Level 0 and 1 data and products from satellite data; (2) facilitating access to in-situ data and their use in integrated analysis; and (3) transition of products from research to operations.
Fischer (new GOOS director) – Albert feels that there are not many current barriers for physical observations and modeling. Issues in the community are how can we track the use of data and the recognition of data providers. The Data Object Identifier (DOI) may be of interest for addressing traceability. Another issue is near shore information and access to data. This could be addressed through common transboundary issues such as tsunamis.

Kawano (open ocean data) – Tak noted that he is active in open ocean measurements. The challenge to the community is in access to coastal data. This is a particular problem when there are many smaller nations in a region with large areas of coastal waters.
Orcutt (OOI information infrastructure) – John asked what is the value of data. There is a need to look at the access and organization of data for use in global models; also, data may be open, but what happens afterwards – may be heterogeneous and not easy to use (Unidata, Neptune) including transformations as you distribute the data. The challenge of provider getting credit for data is important to address, particularly in academia where career paths are based on publication. DOI should be reviewed and discussed.
PearlmanJ (IEEE) Challenges for the community are to improve the exchange between ocean disciplines. Also, volunteer observer contributions are emerging as a possible source of information. There are many issues in this area relating to quality, consistency and volume of data necessary to make the contributions. Open data discussions should consider this issue.
PearlmanF (IEEE, program management) – Francoise wants to assure adequate communication and formulation of issues and outcomes of the WG.
Pirenne (Neptune Canada and Venus) - The two cabled observatories have completely open data access thru website and web services. Benoit supports the introduction of digital object identifiers; secondly, Benoit asked what is the definition of a data set for an online observatory with a continuous flow of information.
Shepherd (EC marine) - Organization policy is that data should be available through free and open access and, preferably, be available through the internet. The acceptance of this policy has not been uniformly adopted. There is still an issue of data access policy with respect to private sources of data. This is a subject that needs consideration.
Iain announced the release of a green paper on marine knowledge in June. From Wikipedia, "a green paper released by the European Commission is a discussion document intended to stimulate debate and launch a process of consultation, at European level, on a particular topic. A green paper usually presents a range of ideas and is meant to invite interested individuals or organizations to contribute views and information. It may be followed by a white paper, an official set of proposals that is used as a vehicle for their development into law." Comments are broadly solicited and Iain encouraged consideration of the paper.
Waldmann (Bremen University and operates a repository PANGEA) - He is looking for cooperation with US through the COOPEUS project that is anticipated to start in September; this is a cross-disciplinary effort involving US and European scientists.
Christoph recommends Intellectual Property Rights (IPR) is an important facet of open data and should be addressed by the working group.

Directions:

The issues raised in the discussions above have significant breadth and some subjects were raised multiple times. In addition, some of the subjects, such as coastal data access, have both technical and political aspects and may not be

addressed as a whole by the WG and the RCN. In selecting subjects, such factors need to be considered.
The potential subjects for the working group in the next six months (not in any order):
1) Collaborative data exchanges
2) DOI
3) Data and Information formats and standards
4) Business models for open data
5) Licensing and Intellectual Property
6) Coastal data access

The WG decided to form task teams to address one or more of the above topics. The outcome of the task teams would be integrated into the WG report to the RCN. Such a task team report will cover background, issues and recommendations. The Open Data WG report would be due in October 2012 and would be reviewed at the Ocean RCN meeting on December 2 in San Francisco.
Decisions on the above topics will be proposed by the co-chairs to the WG and will be prioritized through responses by the WG members. To move forward with a subject above, there should be a task team interested in addressing the issue.
The Open Data WG as a whole agreed to meet by telephone/webex on a monthly basis to review progress and focus sequentially on the issues adopted for review by the WG. The objective is to consider one issue per month, with the exception of perhaps the first upcoming meeting. It is suggested that the facilitators (Francoise and Jay Pearlman) invite outside parties to give presentations at these meetings relevant to the subject being addressed.
The next meeting will be scheduled at the end of May or first week of June. The facilitators will open a doodle poll for meeting scheduling

III-c RCN Open Data Working Group Terms of Reference v3 June 6 2012

Introduction

The oceans provide many important functions within the Earth system including strong coupling with weather and climate dynamics, providing food and energy resources, supporting trade and commerce, offering extensive stabilization for variations in our environment and being a resource for biodiversity. The need for improved coordination in ocean observations is more urgent now given the issues of climate change, sustainable food sources, increased need for energy and the occurrence of disasters (e.g. tsunamis and oil spills). Ocean researchers must work across disciplines to provide policy makers and first responders with clear and understandable assessments of the state of the ocean.

A key element for advancing ocean research and applications is improving access to data. Yet an open data philosophy has not been widespread during the last decades. Various factors have restricted or impacted open data practices. These range from sequestration of data, the use of non-standard conventions for data and metadata

formats and national and regional policies.

There has been a significant trend toward free and open access to data in the last few years. At the GEO Summit in Cape Town, South Africa 2007, the US announced that Landsat data would be available at no charge. The Chinese and Brazilians offered CBERS (satellite) data to Africa at no cost. The GMES Sentinel system subsequently offered similar opportunities. Float and HF radar (current) data from the US (NDBC), JCOMM and OceanSites offer web-based access. However, this global trend is less robust when the observations occur in national waters. Restrictions on data are at the discretion of the national government and vary significantly from country to country.

While there are many technical issues for open access (see next sections), the policy and cultural issues, even within the ocean/academic community will dominate discussions. For example, SCOR and IODE are looking at the challenges of career advancement for publishing quality data without interpretive analyses. Historically, data are sequestered, sometime for years, while preparing analyses and publication. Such items will be points of dialogue for the RCN in conjunction with other organizations. Other areas of intellectual property rights and national security are less tractable for the science community although positive examples do exist. Policy aspects of the free and open access issue have been taken up by GEO at the ministerial level. The RCN contribution will be to address issues within the context of globalizing ocean observations and input to discussions that take place through GEO, IOC, WMO, etc. The RCN will thus encourage the formation of a team to address these areas with a focus on observatories and coastal observations.

Focus Areas

The key question to be addressed is how we can maximize open access to data (in volume as well as timeliness) by a wide variety of users and with the most advanced and appropriate technologies, while respecting intellectual property rights and data policies. The answers should respect the large variation in technical capabilities existing across the globe.

So the main topics to be discussed by the group could be:

- open exchange of data and intellectual property
- open exchange and institutional/national/regional/international data policies
- open exchange and science publishing
- open exchange and real-time data access
- open exchange and key technologies
- data and metadata standards

Terms of reference for the Open Data Working Group

New technologies and approaches are emerging to vastly improve ocean observations. Cabled observatories are an example of a paradigm shift, providing a relative abundance of power and bandwidth for observations covering scales from mm to km and times from microseconds to decades while at the same time reducing

the life cycles costs for ocean observations. Sensors traditionally only available in laboratories can now be adapted for in-situ observations. The potential for interdisciplinary collaboration is significant. To leverage this, an ocean observation Research Coordination Network (RCN:OceanObsNetwork) is proposed.

Observations collected need to be managed and made available to the research community. A balance needs to be found between the interests of the individuals or groups responsible for the collection of the data (and who may wish to use these observations for intellectual work that will contribute to science as well as to his/her career) and those of the global ocean observation and science community desiring broad access to data.

The working group dealing with "Facilitating Open Exchange of Data and Information" will need to address the above-mentioned balance by considering the following elements:

1. Data and Information formats and standards
2. Data access models (incl IPR, business models for open data, data policies, real-time assured access)
3. Data publishing, data citation

For each of the three elements, a task team was created. Each task team was asked to start their work with a literature search on existing practices using this as a part of an assessment of common practices, issues and gaps. In order to facilitate their work an online work space was created for each task team. (accessible through http://iode.grouphub.com). These sites are accessible only by members of the task teams.

Potential steps for each of the task teams could include:

1. Define the meaning of open data from a science and policy perspective;
2. Identify key factors impacting data exchange, data use and data sustainability;
3. Identify trends in data technology, use and policy, understanding their drivers - assess the impact of these trends on a broad, open data policy
4. Address the business models for sustainability of open data
5. With such factors in mind, recommend options on key issues to the RCN for consideration by scientific organizations and policy makers.

The RCN Open Data Working Group (OD WG) environment will be as follows:

1. The RCN WG will operate primarily through electronic information exchange. The WG will have websites, discussion fora and other tools for communication and collaboration.
2. An important element in the work of the groups will be not to re-invent the wheel, but rather identify and possibly compare ongoing initiatives that deal with the selected issues. These will be researched by members of the group and then documented in this web site. Group members can be given permissions to submit content to the web site.

3. Task Teams will establish their own steps and schedules to address subjects within their purview consistent with reporting the results of their investigations and recommendations to the Open Data Working Group at the end of September 2012.
4. The Open Data Working Group will review and comment on the Task Team reports. The Task Teams will address these comments and update their findings and options for a final report to the Working Group, in mid October 2012, which will forward the report to the RCN Plenary.
5. The RCN Plenary will review and comment on the WG reports prior to their forwarding to appropriate parties.

Outputs
The RCN Open Data will develop and deliver reports covering subjects that support achieving the objectives above. The reports will identify issues, approaches and recommendations for achieving the objectives.

III-d Ocean RCN Open Data Working Group, June 7 Minutes.

Minutes of the Meeting of the RCN Open Data Working Group June 7 2012
Attending are: Paul DiGiacomo, James Gallagher, Takashi Kawano, Fred Maltz, Mike McCann, John Orcutt, Jay Pearlman, Benoit Pirenne, Peter Pissierssens, Lisa Raymond, Iain Shepherd, Christoph Waldmann, Sandy Williams
Jay Pearlman provided an introduction to the meeting. He reviewed the agenda for the meeting:
Review of Open Data Working Group Terms of Reference – John Orcutt
Charter for Task Teams – Peter Pissierssens
Schedule to Task Teams – Jay Pearlman
Background of RCN and role of Working Group in RCN – Jay Pearlman
Web site and infrastructure support for Working Group – Pissierssens
Any Other Business
Jay welcomed new members participating in the Task Teams and emphasized the importance and opportunities for the participants
John Orcutt reviewed the Terms of reference. Many new technologies are emerging and will impact ocean observations and information. An example is the cabled observatories with data from microseconds to centuries and kilometer scales. Also, we can now use classes of sensors that take little power and others that are emerging from sensors previously only available in the laboratory. Open data is an issue here because not only the observing scientist will get the data. The Working Group needs to deal with Standards, Open data, Data Access models, how data are stored, published data and data citation. Reward system needs to credit scientists for publishing data and provide consistent referencing. Trend in Europe and the US is towards open data but that doesn't make it happen and we need to recommend to RCN the options for a sustainable process. September 2012 will get the recommendations of the three task groups and in October the Open Data working group will respond and then in December will report to the whole RCN.

Peter addressed the scope and key issues for the task teams. Data and information standards, Data access models (data policy), Data publishing/data citation as a way to create incentives for research. For the Standards Task Team, a key question is: how well has the international ocean research community done in terms of achieving interoperability? What steps should be taken and by whom to improve interoperability. For data access, what are the restrictions and how do these impact research. This should address all disciplines in the ocean community. For data publishing can data publishing/data citation offer a solution and how would it best be implemented.

Jay talked about schedule. The activities of each Task Team should include a review of Literature, comment on status, and what are the remaining outstanding issues. From this base, options for addressing the issues should be defined and recommendations among the options should be offered in the report. Each task team should produce a report by the end of September for review by the entire RCN. Task teams could have experts make presentations at their WebEx meetings and presentations should be documented on the web site. Peter has set this up and will help the teams with inserting material into the site. One advantage of the site use is that overlaps of the Task Teams will be seen and synergies can be taken advantage of. Meetings are not intended to be closed. Meetings are by email and conf call. Each team needs to have a leader and scribe. Teams are requested, by the middle of July to provide an outline of the report and a schedule to get it done. For our schedule over the next four months, meetings are planned for July 2, August 8, September 13 and October 23. All meetings are at 14:00 UTC. Additional meetings of the task teams will be arranged by team members.

Jay provided a background on the Ocean Research Coordination Network (RCN). The RCN was created by NSF to stimulate cross-domain collaborations across ocean research areas. It isn't only physical oceanography that is addressed, but the biology and chemical aspects of the ocean environment. In addition to open data, sustainability is an issue - meaning keeping a flow of observation resources and data with the quality assurance. Outreach is included in the RCN. An objective for late this year is looking at educational courses available remotely. Also, governance is not an easy issue. The RCN meets once a year and the meeting for 2012 will be December 2 in San Francisco just before AGU. New working groups will start with the capacity building next, sometime in the late fall or winter. The terms of reference of the RCN and descriptions will be make available at the WG web site by Peter and Iain will put up an RCN site.

James Gallagher asked if there was an overlap with EarthCube? Jay responded: NSF started EarthCube in the fall and will have the second meeting next week. EarthCube is an infrastructure and science community cyberinformation system. The RCN scope is narrower and our working group will finish before EarthCube get very far. IOOS and others are also working on these problems. We want to add information and intelligence to what has been done.

Iain Shepherd commented that we are addressing more than science in ocean observations. There are monitoring data routinely collected in Europe and elsewhere. Sources include fisheries, water quality and oil platform measurements of the local environment.

Paul spoke about the IOOS call for papers this fall, white papers, for the IOOS Summit. The white paper is about 5 pages. At this point, it is premature to write a paper as the Task Teams are just starting. Paul will make a placeholder. There is also a Blue Planet GEOSS meeting in Brazil in November. We will look at options for reporting the Working Group results, but need to have a full RCN review of recommendations before formal release of outcomes.
The Working Group Web site was discussed by Peter. There is space for material to be posted but Peter can do it for us or we can be given the password to do it ourselves. There is base camp collaboration environment available to the teams. This is the IODE project that supports our efforts. In the write board section of Basecamp, documents can be written by multiple writers and you can track changes. You can identify milestones.
James Gallagher has a question. What are we supposed to use the web Site for? Jay asked if there is a list server associated with this so things can be sent to the team. Yes.
Schedule is needed by July 2. WebEx or toll free calls can be set up by Peter or Jay.

III- e Ocean RCN Open Data Working Group, July 2nd Minutes.

Minutes of August 8, 2012 Open Data Access Webinar
Attendance: Fischer, Gallagher, Gabrynowicz, Kawano, Maltz, Orcutt, Pearlman, Pikula, Pirenne, Pissierssens, Raymond, Stout, Uhlir, Waldmann.
Jay welcomed everyone. He mentioned that the capacity building working group led by Simon Allen and Stewart Bernard will initiate a seminar series on a broad range of topics of interested to ocean science. Initially it will be monthly on the first Tuesday of the month. Rita Caldwell may be one about health. W wish to have an education series with courses on the web.
10:07 Paul Uhlir, Director, Board on Research Data and Information, Policy and Global Affairs Division, The National Academies addressed the issues of intellectual property and open access. He used as his talking point the example of the Global Earth Observations Systems of Systems (GEOSS): "Legal Options for the Exchange of Data through the GEOSS Data-Core". A subgroup on legal interoperability was formed last year. This group addressed the legal aspects of GEOSS Data-Core, moving beyond the traditional technical access discussions. The Data-Core are open access data; generally, restrictions were not wanted and so the preconditions were to have no restrictions on use and reuse. For example, statutory public domain status provides the absence of restrictions on use. Some conditions are considered acceptable: user registration, attribution and recovery of marginal costs for distributions. Additional conditions are under consideration including tagging and data characteristics with a common use licencse. If there is a default copyright then a waiver is needed whereby a private user places data in the public domain. These are how GEOSS Data-Core interoperability can be achieved. Next step in the next year or so will be to investigate data with some restrictions but this will be more difficult.
In the discussions session, Orcutt said that common data core needs a caveat emptor statement. Liability was addressed and it was observed that when you start using

licenses, you have liability. Therefore, it is necessary to establish No Fault. There needs to be no malevolence. Waldmann asked how the Data-Core guidelines will be implemented. Uhlir responded by paraphrasing what licenses are being used for data contributed to the GEOSS Data-Core? The issues are that there is a default copyright in individual countries that applies unless this is waived. These may be quite restrictive and suppliers to the GEOSS Data-Core must address exemptions. Pearlman asked what this group was doing with respect to the other open data activities worldwide. The answer was that they generally address the policy aspects of open data and not the legal aspects. A detailed survey of open data activities on a global scale ahs not been done.
10:25 Prof. Joanne Grabrynowicz, Director, National Center for Remote Sensing, Air, and Space Law at the University of Mississippi added to Paul Uhlir's comments. She said that data isn't just "data", it is an artifact. From different countries there will be different cultural values on data. Different legal systems regarding data exist and may treat data differently. Satellite data have had evolving internal pressure to show value of the satellites by the nation responsible. Previously, funding for space systems was often granted for them for national pride. This is less of a force in the current fiscal environment. So now there are questions asked about the value is to a nation of space-based observations. Some countries insist on charging for the data. Even if the access is free, that doesn't mean the data use is free of all cost. Early in the process Paul and Joanne published in the Journal of Space Law Vol 35 #1 and paper "Towards Implementation of GEOSS Data Sharing Principles". This discussed how the data sharing principles can be enforced, i.e. how do we force compliance; The answer is through peer pressure. [Paul remarked that the 2009 article addresses the policy of GEOSS that were subsequently adopted by GEO.]
10:34 Discussion: Paul said that the high seas except for EEZ are open. Joanne said that ocean data is far from uniform but data from buoys is different from satellite data. How is the data generated and what is the platform and proceed from there. Peter had a question that I missed. Only data guided by the open data policy are included, other data can be excluded. It is voluntary to share data.
Further questions can be sent to them and they will be happy to address them.
10:38 Jay thanked Paul and Joanne.
10:39 Lisa and Peter presented the first report. Data Publication/Citation is a way to create incentive for scientists to offer access to their data.
Sandy,
Can you forward this to Lisa and ask her to put her messages into the minutes? There was an audio recording of the meeting if she cannot do it.

Traditional journal articles are assigned persistent… Tracking data provenance is best practice. MBL WHOI has worked with authors to deposit data… WHOAS has a form on the server describing the data that is deposited. Elsevier wants to link the WHOAS data to their publications. BCO-DMO is a permanent repository for data of biological and chemical oceanographic data. Use Case Two: PDL is implemented by the British Oceanographic Data Centre and included metadata. There are also Dryad, Pangeo, and Dspace@MIT In conclusion incentives are there to make data publication and its availability and security are attractive. It adds value to a

research paper. This presentation is being prepared as a paper. [Orcutt said that the identifiers are helpful.]
10:50 John Orcutt spoke about progress on his team.
10:55 Sandy Williams spoke about the progress of his team.
Peter asked for briefing materials to be sent to him for inclusion in the web site.
Joanne agreed to forward the 2009 Space Law article.
Jay noted that the next meeting of the working group will be September 13, 2012 at 14:00 UTC. At that meeting, reports of the three task teams will be reviewed in more depth.
Meeting ended

Appendix IV – Presentations, Posters and Papers.

IV-a RCN Ocean Meeting

See presentation at
https://docs.google.com/open?id=0B6ovZrDPKFGuRll6LU45cTBCY3c

IV-b Paper on Interdisciplinary Ocean Research – addressing the challenges – Jay Pearlman et al.

See paper at https://docs.google.com/open?id=0B6ovZrDPKFGuOF93X1ZkaE1DT3M

IV-c Presentation on Interdisciplinary Ocean Research – addressing the challenges – Jay Pearlman et al.

See presentation at
https://docs.google.com/open?id=0B6ovZrDPKFGuZ0pSOTZSZXBJaGs

IV-d Paper on A new Perspective on Long Term Oceans observation – Christoph Waldmann et al.

See paper at https://docs.google.com/open?id=0B6ovZrDPKFGuWEhQamF1emJjMjg

IV e – Poster The Ocean Research Coordination Network Interdisciplinary Collaboration, Jay Pearlman and Albert Williams 3rd

See presentation at
https://docs.google.com/open?id=0B6ovZrDPKFGuaUt6YzRjdnNEb2M

Appendix V- Webinar announcements and recording material

V-a Rita Colwell

Blue Marvel – Ocean Mysteries

In a collaboration of the US National Science Foundation and the Group on Earth Observations, the NSF-funded Ocean Research Collaboration Network is proud to announce the first webinar in the series "Blue Marvel – Ocean Mysteries." The series will look at the ocean and its impact on us - from life in the ocean to human life on Earth. Whether it is food, disease, climate change or recreation, oceans affect us directly or indirectly. But we know little about the oceans. There are parts of the oceans that are more mysterious than the surface of the moon. The series will look at the mysteries and impacts of the ocean - the Blue Marvel - and how research and a broad spectrum of scientists, from engineers to chemists, microbiologists to archaeologists play a role in finding the answers.

The first of these web-based seminars, "Oceans, Climate and Human Health: the cholera paradigm" will be presented by Dr. Rita Colwell on Tuesday the 16 October at 10AM EDT/14:00 UTC. For more information and access to the webinar, go to **www.oceanmysteries.net** after September 18.

Dr. Colwell was the 11th director of the United States' National Science Foundation from 1998 to 2004 before becoming Chief Scientist at Canon U.S. Life Sciences. Dr. Colwell is an internationally recognized authority on cholera and infectious diseases and has remarkable understanding of the complex interplay of the "Earth system."

V-b Tony Haymet

Blue Marvel – Ocean Mysteries

In a collaboration of the US National Science Foundation, the IEEE and the Group on Earth Observations, the NSF-funded Ocean Research Collaboration Network is proud to announce the second webinar in the series "Blue Marvel – Ocean Mysteries." The series is focused on the ocean and its impact on us - from life in the ocean to human life on Earth.

The second of these web-based seminars, **"From Chemistry to Antarctica to Scripps Oceanography: One Journey"** will be presented by Dr. Tony Haymet on Thursday November 8 at 12 noon EDT/17:00 UTC.

Tony Haymet is Director of Scripps Institution of Oceanography, Vice Chancellor for Marine Sciences and Dean of the Graduate School of Marine Sciences at University of California, San Diego. He is co-founder and vice chair of CleanTECH San

Diego, a business organization devoted to climate change issues. He is on the board of the Consortium for Ocean Leadership, Partnership for Observation of the Global Oceans and other organizations. Dr. Haymet is a distinguished researcher with more than 165 peer-reviewed articles and numerous Op-Ed pieces in leading newspapers around the world. He was formerly Chief of Marine and Atmospheric Science and then the Science and Policy Director at the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia. Dr. Haymet is a tenured Professor of Oceanography at Scripps, and of Chemistry & Biochemistry at UCSD. He holds a Ph.D. from the University of Chicago and a Doctor and Bachelor of Science from the University of Sydney.

Appendix VI – Reports

VI –a Open Data Formats and Standards Report (Draft)

See report at
https://docs.google.com/open?id=0B6ovZrDPKFGuZHU1dzUyU1lHMkE

VI – b Data Access Models Report (draft)

See report at
https://docs.google.com/open?id=0B6ovZrDPKFGuMEJweGczVXpmb3M

VI – c Data Publication/Citation Report (Draft)

See report at https://docs.google.com/open?id=0B6ovZrDPKFGualo0OFJRajhQRTg

VI-d RCN Plenary Report, December 2, 2012 meeting (draft)

See document at
https://docs.google.com/folder/d/0B6ovZrDPKFGubVFRYjRuQ21uelk/edit

Appendix VII Outreach Material

VII a – RCN Flyer

For the PowerPoint version of this flyer, go to
https://docs.google.com/open?id=0B6ovZrDPKFGuOUZ6azVmT2VHaTA

Appendix VIII Report on Standards and Best Practices for infrastructure interoperability within ocean observing systems.

The work engaged in by OMS Tech, Inc. for this subcontract included three main efforts:

- outreach to compile information related to existing and planned standards for infrastructure interoperability within ocean observing systems from an end-to-end system perspective;
- enter the gathered standards into the Standards and Interoperability Registry (SIR), and enter gathered best practices into the Best Practices Wiki (BPW), in an area that OMS Tech will create and configure for the RCN effort;
- build a compendium of quality indicators.

In order to support proper use of the BPW, it needed to be upgraded from an earlier version to support normalized maintenance and utilize new features, primarily content moderation. Due to Hurricane Sandy, this upgrade was delayed for logistics reasons, and still needs to be completed. Completion of the BPW upgrade and full testing will be complete by January 14, assuming no major problems are experienced.

Outreach

The outreach effort for the collection of standards and best practices was a very lengthy process, resulting in a collection of information about various ocean observing systems and related operations. This effort was based upon interviews with people responsible for, or knowledgeable of, observing systems and operations, and upon OMS Tech's own collection of available information found on websites and documents. The interviews were very difficult to obtain. It usually took many weeks to many months to finalize the collection of a single observing system. This was due to schedule conflicts and competing priorities. Many invitations for interviews were never responded to, even after repeated attempts. The information collected without interviews is somewhat incomplete due to not being able to speak with someone. All collected information has been compiled in a spreadsheet. Due to the complications and time required in gathering the information, outreach should be a continuing effort in 2013. This will allow the collection of information to be enhanced in both size and detail.

Registry Usage

Populating the SIR and BPW with the collected information from the outreach effort will be completed after the successful upgrade of the BPW and the successful migration of the SIR to a new virtual operating environment. Both of these efforts were delayed by Hurricane Sandy.

The standards collected will be added to the SIR if not already present. The best practices collected will be reflected in the BPW in a special area setup for the RCN effort. This area will be readable by the public, but only editable by OMS Tech, Inc.

and any other person involved in the RCN effort that OMS Tech is notified should have access.

Quality Indicators

During the collection of information from ocean observing systems and related operations, OMS Tech also collected information on quality indicators used for the acquired data. Only high level quality indicator information was collected, leaving the detailed and technical aspects to be considered in 2013. The result of this effort shows that many systems rely on very rudimentary QA/QC tests, along with quality indicators that often do not convey very much information. However, there are some quality efforts that have implemented more sophisticated tests and indicators. Many efforts have indicated that they are moving towards the implementation of more standardized procedures, but that progress is slow and ongoing.

Conclusion

The collected information for standards, best practices, and quality indicators will be placed into the SIR and BPW as soon as those servers have been fully migrated and upgraded. As well, the effort for gathering the information will continue so that those who did not respond to an interview request can eventually contribute to the compendium of information. This will enhance the collection and make it more valuable to the overall RCN effort.